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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/927,718	08/10/2001	Owen H. Bailey	DP-302920	6362
7590	10/08/2003		EXAMINER	
DELPHI TECHNOLOGIES, INC.			SODERQUIST, ARLEN	
Legal Staff			ART UNIT	PAPER NUMBER
P.O Box 5052			1743	
Mail Code: 480-414-420			DATE MAILED: 10/08/2003	
Troy, MI 48007-5052			4	

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.	BAILEY ET AL.
Examiner	Art Unit
Arlen Soderquist	1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) Responsive to communication(s) filed on \_\_\_\_\_.  
2a) This action is FINAL.                  2b) This action is non-final.  
3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) Claim(s) 1-25 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.  
5) Claim(s) \_\_\_\_ is/are allowed.  
6) Claim(s) 1-7 and 9-25 is/are rejected.  
7) Claim(s) 8 is/are objected to.  
8) Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) The specification is objected to by the Examiner.  
10) The drawing(s) filed on \_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
11) The proposed drawing correction filed on \_\_\_\_ is: a) approved b) disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.  
12) The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) All b) Some \* c) None of:  
1. Certified copies of the priority documents have been received.  
2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.  
14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) The translation of the foreign language provisional application has been received.  
15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) Notice of References Cited (PTO-892)  
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2-3.

4) Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.  
5) Notice of Informal Patent Application (PTO-152)  
6) Other: \_\_\_\_\_

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1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-6, and 9-16 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Hepburn (US 5,974,788). In the patent Hepburn teaches method and apparatus for desulfating a NO<sub>x</sub> trap in an automobile exhaust system. The SO<sub>x</sub> (desulfating) purge temperature is achieved by modulating the amplitude of the A/F of the mixture supplied to the engine thereby storing oxygen in the trap during lean engine cylinder events and generating the required exotherm during rich engine cylinder events. The exhaust system (22), comprising one or more exhaust pipes and an exhaust flange (24) transports exhaust gas produced from combustion of an air/fuel mixture in the engine to a conventional three-way catalytic converter (TWC, 26). The converter contains catalyst material that chemically alters the exhaust gas to generate a catalyzed exhaust gas. A heated exhaust gas oxygen (HEGO) sensor (28) detects the oxygen content of the exhaust gas generated by the engine (18) and transmits a representative signal to the electronic engine controller (EEC, 20). A NO<sub>x</sub> trap (32) is located downstream of the converter for trapping nitric oxide contained in the exhaust gas exiting the converter. A HEGO sensor (34) detects the oxygen content of the exhaust gas upstream of the trap while a HEGO sensor (36) detects the oxygen content of the exhaust gas downstream of the trap. The sensors transmit signals to the EEC. The NO<sub>x</sub> trap contains a temperature sensor (42) for measuring the midbed temperature which is provided to the EEC. Other sensors (46) provide additional information about engine performance to the EEC such as crankshaft position, angular velocity, throttle position, air temperature, etc. The information from these sensors is used by the EEC to control engine operation. This information is used to determine when the amount of sulfur deposited on the NO<sub>x</sub> trap has reached a point that it needs to be removed by heating above the normal operating temperature. During the desulfation process, the A/F ratio and spark advance are controlled. The A/F ratio span determines the exotherm in the trap. However, the spark advance is preferably controlled to avoid power surges and sags during the desulfation. During the lean A/F desulfation event, the spark advance is adjusted to MBT. During the rich desulfation event, the

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spark advance is retarded. The desulfation process is started with lean modulation, to store oxygen in the trap. After the trap's oxygen storage capacity is attained, the A/F is switch rich. During the rich half of the event, a catalytic exotherm is generated in the trap, raising its temperature. After the temperature reaches the desired temperature, say 650°C., and remains at the desired temperature for a prescribed time during which the A/F is biased rich, the desulfation event is terminated. Columns 5-6 teach how the determination is made to start the desulfation process.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn as applied to claim 1 above, and further in view of Daudel (US 5,369,956). Hepburn teaches a temperature sensor for the NO<sub>x</sub> trap but does not teach another type of sensor disposed within the treatment device.

In the patent Daudel teaches an exhaust gas aftertreatment device for internal combustion engines having a catalyzer for the selective catalytic reduction of oxides of nitrogen from exhaust gases of motor vehicle diesel engines, provides overstoichiometric supply of NH<sub>3</sub> or materials releasing NH<sub>3</sub>. A first sensor records the NH<sub>3</sub> concentration contained in the exhaust gas and interrupts the supply of the NH<sub>3</sub> quantity when a specified upper threshold value is reached. A second sensor records the NH<sub>3</sub> adsorbed in the catalyzer, by way of which the NH<sub>3</sub> supply is resumed on reaching a specified lower threshold value. Alternatively, only one NH<sub>3</sub> sensor is

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provided in the exhaust gas aftertreatment device. The NH<sub>3</sub> concentration determined by this single sensor is compared, as the actual value, with a required value corresponding to a specified NH<sub>3</sub> concentration in order to form a correction signal which is used for triggering the metering appliance continuously connected into the gas phase.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a sensor disposed within the treatment device of Hepburn because of the ability to measure the concentration of the thing being stored by the treatment device with the device as taught by Daudel.

5. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn as applied to claim 10 above, and further in view of Höhne. Hepburn does not teach measuring the nitrogen oxide storage capacity directly.

In the patent Höhne teaches a process for the operation of a nitrogen oxides storage catalyst. Column 3 teaches a prior art device and method in which the determination of the nitrogen oxide storage capacity from the measured oxygen storage capacity to determine when regeneration of the catalyst is need.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the nitrogen oxides storage capacity from the measured oxygen storage capacity in the Hepburn method because of the ability to determine the need to regenerate the catalyst as taught by Höhne.

6. Claims 20-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hepburn as applied to claims 10-16 above, and further in view of Hamburg (US 5,077,970). Hepburn does not teach detecting emissions breakthrough.

In the patent Hamburg teaches a method of on-board detection of automotive catalyst degradation in which a plurality of sensors (12,20) are used to monitor the state of the catalyst (21). Figures 8 and ten show examples of signal from the sensors is used to detect the occurrence of breakthrough in the catalyst and the degradation state of the catalyst.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to determine the breakthrough in the Hepburn method as taught by Hamburg because of the ability to monitor the catalyst degradation as taught by Hamburg.

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7. Claim 8 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The art of record fails to teach or fairly suggest the structure as defined by claim 8.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional art relates to sensors and exhaust treatment devices for internal combustion engines. In particular the Theis reference anticipates one or more of the instant claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



September 30, 2003

ARLEN SODERQUIST  
PRIMARY EXAMINER